Application for a Locally Adopted Energy Standards by the City of Palo Alto in Accordance With Section 10-106 of the California Code of Regulations, Title 24, Part 1

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1.0 Executive Summary

The City of Palo Alto has researched and reviewed the feasibility and cost-effectiveness of building permit applicants exceeding the 2008 Building Energy Efficiency Standards to meet minimum energy-efficiency requirements of LEED and GreenPoint Rated. On October 19, 2009 the Palo Alto City Council approved the introduction of a revised green building ordinance, revised energy ordinance and revised Tables A and B which clarify compliance requirements with the companion ordinances. The City of Palo Alto would appreciate California Energy Commission approval at the earliest possible date, or no later than the estimated local effective date of January 1, 2010.

- **Table A** (see page 3) covers Nonresidential buildings. It references LEED as the applicable green building rating system and minimum threshold required for different categories of construction; and indicates when exceeding the 2008 standards by a minimum of 15% applies to that category.

- **Table B** (see page 4) covers Residential buildings. It references GreenPoint Rated as the applicable green building rating system and a minimum threshold required for different categories of construction; and indicates when exceeding the 2008 standards by a minimum of 15% is required for that category.

Gabel Associates, LLC has been retained to assist in developing this application to the Commission. The proposed local energy efficiency standards and implementation within the green building ordinance have been designed with several key criteria in mind.

- Consistency with the structure, format and calculation methods of the 2008 Title 24 Building Energy Efficiency Standards;

- Meeting local energy compliance requirements as defined by the Ordinance which exceed the current Title 24 standards; and,

- The provision of flexibility for building permit applicants in meeting the Ordinance by the performance approach using building and appliance energy measures.

This application to the California Energy Commission conforms to the requirements in Section 10-106 of the California Code of Regulations, Title 24, Part 1, *LOCALLY ADOPTED ENERGY STANDARDS*. The proposed ordinance shall take effect only after the Commission has reviewed and formally approved the proposed local energy standards as meeting all requirements of Section 10-106, and the ordinance has been filed with the Building Standards Commission.

Note: Applicants are advised to use this table only in conjunction with the entirety of requirements in Chapter 18.44 (Green Building Regulations)

Table A. City of Palo Alto Green Building Standards for Compliance for Private Nonresidential Construction and Renovation

Type of Project	Rating System, Code or Program	Minimum Threshold Required	Requirement to Exceed CA Title 24 Part 6 (15%)*	Verification**
1. New construction ≥ 5,000 sf (including additions to existing buildings)	USGBC LEED	LEED Silver	YES	GBCI or CPA
2. New Construction ≥ 500 sf and < 5,000 sf (including additions to existing buildings)	USGBC LEED	LEED Prerequisites + 5 points (round up) required for every 500 sf	YES	GBCI or CPA
3. Tenant improvements, renovations, or alterations ≥ 5,000 sf that include replacement or alteration of at least two of the following: HVAC system, building envelope, hot water system, or lighting system.	USGBC LEED	LEED Certified	NO	GBCI or CPA
4. Tenant improvements, renovations or alterations ≥ 500 sf and ≥ $100,000 in valuation that don't fall under Project Type 3, above.	USGBC LEED AND Energy STAR Portfolio Manager	LEED Checklist Building Energy Performance Rating	NO	CPA

* The requirement to exceed CA Title 24 Part 6 by 15% is also referenced for these project types in the applicable green building rating system, and the City's Energy Efficiency Ordinance.

** For project types 1) and 2), if CPA is chosen for verification, performance 15% beyond California Energy Code, Title 24, Part 6 is an acceptable compliance equivalent to the LEED energy prerequisite. The project will not be required to do additional modeling beyond state requirements.

Special Considerations & Definitions	
Mixed Use Developments	Mixed use projects must comply with the applicable project type requirements based on the scope of the project. Table applicability is to be determined by the Planning Director; generally the provisions of Table A will apply to the commercial portion of the development, and the provisions of Table B will apply to the residential portions of the development.
Historic Structures	Exemptions may be available for historic structures, pursuant to 18.44.070 Palo Alto Municipal Code.
Multi Year Cumulative Construction	Cumulative new construction or renovations over any 2-year period s shall be considered as a single project, subject to the highest level of green building requirements for that project, unless exempted by the Planning Director as impractical for compliance.
Unusual Projects	Projects with an unusual scope of work or with unique circumstances may apply for an exemption to the green building requirements to be determined by the Planning Director, pursuant to Palo Alto Municipal Code Section 18.44.070.
USGBC LEED	USGBC LEED stands for the U.S. Green Building Council Leadership in Energy and Environmental Design. Projects must comply with the applicable and current LEED® rating system. An alternative, equivalent rating system or program may be substituted as approved by the Planning Director, after recommendation by the applicant or Architectural Review Board (if ARB review is required).
GBCI	The Green Building Certification Institute provides 3rd party verification services for the LEED rating system.
CPA	City of Palo Alto staff with expertise in green building will provide in-house review similar in structure and stringency to that of the GBCI.
Energy STAR Portfolio Manager	Energy STAR Portfolio Manager (Portfolio Manager) shall mean the program managed by the U.S. Environmental Protection Agency that offers an energy management tool that allows an applicant to track and assess energy and water consumption of a building project. Tracked projects receive an energy performance rating on a scale of 1–100 relative to similar buildings nationwide. The applicant is not required to achieve a set rating.
Building Envelope	The building envelope is the ensemble of exterior and demising partitions of a building that enclose conditioned space. (Defined by California Energy Code Title 24, Part 6)
Prerequisites	Prerequisites are green building strategies required by the LEED rating system before points may be claimed for any project type. They are mandatory measures, not option.

Note: Applicants are advised to use this table only in conjunction with the entirety of requirements in Chapter 18.44 (Green Building Regulations)

Table B. City of Palo Alto Green Building Standards for Compliance for Private Residential Construction and Renovation

Type of Project	Rating System, Code or Program	Minimum Threshold Required	Requirement to Exceed CA Title 24 Part 6 (15%)*	Verification
Multi-Family Residential				
1. New construction of 3 or more attached units	BIG GPR Multifamily ≥ 30 units complete the LEED-ND (Neighborhood Development) checklist	70 points	YES	GreenPoint Rated and/or CPA
2. Renovations or alterations ≥ 50% of the existing unit sf and that include replacement or alteration of at least two of the following: HVAC system, building envelope, hot water system, or lighting system	BIG GPR Multifamily	50 points	Follow the BIG GPR minimum energy requirements.	GreenPoint Rated and/or CPA
3. Renovations, additions, and/or rebuilds to individual units ≥ 250 sf and valuation ≥ $100,000 in a single unit	BIG GPR HERS II	Checklist HERS Rating (requirement effective January 2011)	NO	CPA
Single-Family and Two-Family Residential				
4. New construction of ≥ 1,250 sf	BIG GPR Single-Family	70 points + 1 point per additional 70 sf over 2,550 (150 points maximum)	YES	GreenPoint Rated and/or CPA
5. Existing home additions or rebuilds ≥ 1,250 sf	Chose one of the following two options: Option 1: BIG GPR Single Family or Existing Home OR Option 2: CA Energy Code T-24 Part 6 and HERS II	 50 points The whole house must demonstrate that the TDV Energy of the building is at least 15% less than the TDV energy of the standard building based on the prototypical house of its vintage and receive a HERS II rating. (requirement effective January 2011)	YES Use of the "Existing Alterations Performance Approach" as outlined under CA Title 24 Part 6 is acceptable.	GreenPoint Rated and/or CPA HERS II Rater and CPA
6. Existing home renovations, rebuilds and/or additions totaling ≥ 250 sf and < 1,250 sf and ≥ $100,000 valuation	BIG GPR Existing Home AND HERS II	Checklist HERS II Rating (requirement effective January 2011)	NO	CPA HERS II Rater and CPA

2.0 Impacts of the New Ordinance

The energy performance impacts of the new ordinance have been evaluated using five case studies, which collectively reflect the broad range of building types covered by the Ordinance.

- Three single family home designs: 1,705 sf; 2,682 sf; 5,074 sf
- Single family addition analyzed alone (without the existing house): 1,295 sf
- Low-rise multi-family residential building: 8,442 sf, 8 dwelling units
- High-rise multi-family residential building: 36,800 sf, 40 dwelling units
- 1-Story nonresidential office building: 10,580 sf
- 5-Story nonresidential office building: 52,900 sf

The methodology used in the case studies replicates how actual buildings are designed and evaluated to meet or exceed the State's energy efficiency standards.

(a) Each prototype building design is tested for compliance with the 2008 Standards, and all energy efficiency measures are adjusted with commonly used construction methods to just barely meet the Standards. The energy efficiency measures chosen are a combination of measures which reflects how designers and builders are most likely to achieve a specified level of performance.

(b) Starting with a 2008 Standards minimally compliant set of measures, various energy related elements are changed to just reach the minimum energy performance required by the Ordinance (e.g. 15% better than 2008 Title 24). In this study, the design choices selected are based on many years of experience by the author working with architects, mechanical engineers and builders coupled with general knowledge of the relative incremental costs of most measures. The intent of this approach is to ensure that the study reflects how building energy performance is actually evaluated and used to select final energy efficiency measures.

(c) A minimum and maximum range of incremental costs of added energy efficiency measures is established by a variety of research means. A construction cost estimator, Building Advisory LLC, was contracted to conduct research and surveys to derive accurate and current costs of measures. Site energy in KWh and Therms, is calculated for each model run to establish the annual energy savings, energy cost savings and CO2-equivalent reductions in greenhouse gases.

2.1 New Single Family Homes

Energy design descriptions of the single family building prototypes which just meet the 2008 Title 24 Building Energy Efficiency Standards:

Single Family House: 1,705 square feet, 2-story, 16.3% glazing/floor area ratio – Option A

Energy Efficiency Measures
R-38 Roof w/ Radiant Barrier
R-13 Walls
R-0 Slab on Grade
Low E2 Vinyl Windows, U=0.36, SHGC=0.30
Furnace: 80% AFUE
Air Conditioner: 13 SEER
R-6 Attic Ducts
Reduced Duct Leakage/Testing (HERS)
50 Gallon Gas Water Heater: EF=0.60

Single Family House: 1,705 square feet, 2-story, 16.3% glazing/floor area ratio – Option B

Energy Efficiency Measures
R-38 Roof w/ Radiant Barrier
R-13 Walls
R-0 Slab on Grade
Low E2 Vinyl Windows, U=0.36, SHGC=0.30
Furnace: 80% AFUE
Air Conditioning: None
R-6 Attic Ducts
Reduced Duct Leakage/Testing (HERS)
50 Gallon Gas Water Heater: EF=0.60

Single Family House: 2,682 square feet, 2-story, 21.1% glazing/floor area ratio – Option A

Energy Efficiency Measures
R-38 Roof w/ Radiant Barrier
R-15 Walls
R-19 Raised Floor
Low E2 Vinyl Windows, U=0.36, SHGC=0.30
Furnace: 80% AFUE
Air Conditioner: 13 SEER
R-8 Attic Ducts
50 Gallon Gas Water Heaters: EF=0.60

Single Family House: 2,682 square feet, 2-story, 21.1% glazing/floor area ratio – Option B

Energy Efficiency Measures
R-38 Roof w/ Radiant Barrier
R-15 Walls
R-19 Raised Floor
Low E2 Vinyl Windows, U=0.36, SHGC=0.30
Furnace: 80% AFUE
Air Conditioner: None
R-8 Attic Ducts
50 Gallon Gas Water Heaters: EF=0.60

Single Family House: 5,074 square feet, 2-story, 22.7% glazing/floor area ratio – Option A

Energy Efficiency Measures
R-38 Roof w/ Radiant Barrier
R-13 Walls
R-19 Raised Floor
Housewrap
Low E2 Vinyl Windows, U=0.36, SHGC=0.30
(2) Furnaces: 80% AFUE
(2) Air Conditioners: 13 SEER
(2) Air Conditioners: TXV + Refrig. Charge (HERS)
R-6 Attic Ducts
Reduced Duct Leakage/Testing (HERS)
(2) 50 Gallon Gas Water Heaters: EF=0.62
Pipe Insulation

Single Family House: 5,074 square feet, 2-story, 22.7% glazing/floor area ratio – Option B

Energy Efficiency Measures
R-38 Roof w/ Radiant Barrier
R-13 Walls
R-19 Raised Floor
Housewrap
Low E2 Vinyl Windows, U=0.36, SHGC=0.30
(2) Furnaces: 80% AFUE
(2) Air Conditioners: 13 SEER
(2) Air Conditioners: TXV + Refrig. Charge (HERS)
R-6 Attic Ducts
Reduced Duct Leakage/Testing (HERS)
(2) 50 Gallon Gas Water Heaters: EF=0.62
Pipe Insulation

Energy Measures Needed to Meet the City's Ordinance

The following energy efficiency features have been modified from the Title 24 set of measures so that the home designs use 15% less TDV energy than the corresponding Title 24 base case designs per the 2008-2011 Build it Green GreenPoint Rated minimum energy requirement. The incremental first cost estimate to provide each measure in comparison with the equivalent base case measure is listed to the right in the following tables.

The incremental energy efficiency improvements specified above to meet the proposed Ordinance requirements are variables selected by designer, builder or owner. There are a number of considerations in choosing the final mix of energy efficiency measures including first cost, aesthetics, maintenance and replacement.

15% Better Than Title 24 Base Case, Option A **1705 sf** **Climate Zone 4**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier	-	$ -	$ -	$ -
R-19 Walls (from R-13): 1,328 sf @ $0.31 to $0.54/sf	Upgrade	$ 412	$ 717	$ 564
R-0 Slab on Grade	-	$ -	$ -	$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	$ -	$ -	$ -
Furnace: 90% AFUE (from 80% AFUE)	Upgrade	$ 500	$ 1,000	$ 750
Air Conditioner: 13 SEER, 11 EER (HERS)	Upgrade	$ 25	$ 75	$ 50
Air Conditioner: TXV + Refrig. Charge (HERS)	Upgrade	$ 100	$ 150	$ 125
R-8 Attic Ducts (from R-6)	Upgrade	$ 225	$ 325	$ 275
Reduced Duct Leakage/Testing (HERS)	-	$ -	$ -	$ -
50 Gallon Gas Water Heater: EF=0.62 (from EF=0.60)	Upgrade	$ 100	$ 200	$ 150
Total Incremental Cost of Energy Efficiency Measures:		**$ 1,362**	**$ 2,467**	**$ 1,914**
Total Incremental Cost per Square Foot:		**$ 0.80**	**$ 1.45**	**$ 1.12**

15% Better Than Title 24 Base Case, Option B **1705 sf** **Climate Zone 4**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier	-	$ -	$ -	$ -
R-19 Walls (from R-13): 1,328 sf @ $0.31 to $0.54/sf	Upgrade	$ 412	$ 717	$ 564
R-0 Slab on Grade	-	$ -	$ -	$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	$ -	$ -	$ -
Furnace: 92% AFUE (from 80% AFUE)	Upgrade	$ 500	$ 1,200	$ 850
Air Conditioning: None	-	$ -	$ -	$ -
R-8 Attic Ducts (from R-6)	Upgrade	$ 225	$ 325	$ 275
Reduced Duct Leakage/Testing (HERS)	-	$ -	$ -	$ -
50 Gallon Gas Water Heater: EF=0.62 (from EF=0.60)	Upgrade	$ 100	$ 200	$ 150
Total Incremental Cost of Energy Efficiency Measures:		**$ 1,237**	**$ 2,442**	**$ 1,839**
Total Incremental Cost per Square Foot:		**$ 0.73**	**$ 1.43**	**$ 1.08**

15% Better Than Title 24 Base Case, Option A **2682 sf** **Climate Zone 4**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier	-	$ -	$ -	$ -
R-15 Walls	-	$ -	$ -	$ -
R-19 Floor	-	$ -	$ -	$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	$ -	$ -	$ -
Furnace: 90% AFUE (from 80% AFUE)	Upgrade	$ 500	$ 1,000	$ 750
Air Conditioner: 13 SEER, 11 EER (HERS)	Upgrade	$ 25	$ 75	$ 50
Air Conditioner: TXV + Refrig. Charge (HERS)	Upgrade	$ 100	$ 150	$ 125
R-8 Attic Ducts	-	$ -	$ -	$ -
Reduced Duct Leakage/Testing (HERS)	Upgrade	$ 300	$ 600	$ 450
50 Gallon Gas Water Heater: EF=0.62 (from EF=0.60)	Upgrade	$ 100	$ 200	$ 150
Total Incremental Cost of Energy Efficiency Measures:		**$ 1,025**	**$ 2,025**	**$ 1,525**
Total Incremental Cost per Square Foot:		**$ 0.38**	**$ 0.76**	**$ 0.57**

15% Better Than Title 24 Base Case, Option B **2682 sf** **Climate Zone 4**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier	-	$ -	$ -	$ -
R-15 Walls	-	$ -	$ -	$ -
R-19 Floor	-	$ -	$ -	$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	$ -	$ -	$ -
Housewrap: 2,137 sf @ $0.50 to 0.75/sf	Upgrade	$ 1,069	$ 1,603	$ 1,336
Furnace: 90% AFUE (from 80% AFUE)	Upgrade	$ 500	$ 1,000	$ 750
Air Conditioner: None	-	$ -	$ -	$ -
R-8 Attic Ducts	-	$ -	$ -	$ -
Reduced Duct Leakage/Testing (HERS)	Upgrade	$ 300	$ 600	$ 450
50 Gallon Gas Water Heater: EF=0.62 (from EF=0.60)	Upgrade	$ 100	$ 200	$ 150
Total Incremental Cost of Energy Efficiency Measures:		**$ 1,969**	**$ 3,403**	**$ 2,686**
Total Incremental Cost per Square Foot:		**$ 0.73**	**$ 1.27**	**$ 1.00**

15% Better Than Title 24 Base Case, Option A **5074 sf** **Climate Zone 4**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier	-	$ -	$ -	$ -
R-19 Walls (from R-13): 2,590 sf @ $0.31 to $0.54/sf	Upgrade	$ 803	$ 1,399	$ 1,101
R-30 Raised Floor (from R-19): 3,044 sf @ $0.25 to $0.35	Upgrade	$ 761	$ 1,065	$ 913
Housewrap	-	$ -	$ -	$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	$ -	$ -	$ -
(2) Furnaces: 92% AFUE (from 80% AFUE)	Upgrade	$ 1,000	$ 2,400	$ 1,700
(2) Air Conditioners: 13 SEER, 11 EER (HERS)	Upgrade	$ 50	$ 150	$ 100
(2) Air Conditioners: TXV + Refrig. Charge (HERS)	-	$ -	$ -	$ -
R-8 Attic Ducts (from R-6)	Upgrade	$ 400	$ 600	$ 500
Reduced Duct Leakage/Testing (HERS)	-	$ -	$ -	$ -
(2) 50 Gallon Gas Water Heaters: EF=0.62	-	$ -	$ -	$ -
Pipe Insulation	-	$ -	$ -	$ -
Total Incremental Cost of Energy Efficiency Measures:		**$ 3,014**	**$ 5,614**	**$ 4,314**
Total Incremental Cost per Square Foot:		**$ 0.59**	**$ 1.11**	**$ 0.85**

15% Better Than Title 24 Base Case, Option B **5074 sf** **Climate Zone 4**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier	-	$ -	$ -	$ -
R-19 Walls (from R-15): 2,590 sf @ $0.15 to $0.40/sf	Upgrade	$ 389	$ 1,036	$ 712
R-19 Floor	-	$ -	$ -	$ -
Housewrap	-	$ -	$ -	$ -
Super Low E Vinyl Windows, U=0.36, SHGC=0.23, 1151.8 sf @ $1.40 - $1.75 / sf	Upgrade	$ 1,613	$ 2,016	$ 1,814
(2) Furnaces: 90% AFUE (from 80% AFUE)	Upgrade	$ 1,000	$ 2,000	$ 1,500
Air Conditioners: None	-	$ -	$ -	$ -
R-6 Attic Ducts	-	$ -	$ -	$ -
Reduced Duct Leakage/Testing (HERS)	-	$ -	$ -	$ -
(2) 50 Gallon Gas Water Heaters: EF=0.62	-	$ -	$ -	$ -
Total Incremental Cost of Energy Efficiency Measures:		**$ 3,001**	**$ 5,052**	**$ 4,026**
Total Incremental Cost per Square Foot:		**$ 0.59**	**$ 1.00**	**$ 0.79**

2.2 Addition to Existing Home

The energy design description of the addition prototype which just meets the 2008 Title 24 Building Energy Efficiency Standards is listed below:

1-Story 1,295 sf Addition, 19.5% glazing/floor area ratio

Energy Efficiency Measures
R-19 Roof w/ Radiant Barrier
R-13 Walls
R-13 Raised Floor
Low E2 Vinyl Windows, U=0.36, SHGC=0.30
Furnace: 80% AFUE
Air Conditioner: 13 SEER
R-8 Attic Ducts
Reduced Duct Leakage/Testing (HERS)
No Water Heating Calculation Allowed for Addition Alone

Energy Measures Needed to Meet the City's Ordinance

15% Better Than Title 24 Option A **1295 sf** **Climate Zone 3**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier (from R-19 w/Radiant Barrier): 700 sf @ 0.30 to 0.45/sf	Upgrade	$ 210	$ 315	$ 263
R-13 Walls	-	$ -	$ -	$ -
R-19 Raised Floor (from R-13): 700 sf @ $0.10 to $0.25	Upgrade	$ 70	$ 175	$ 123
Quality Insulation Installation (HERS)	Upgrade	$ 450	$ 600	$ 525
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	$ -	$ -	$ -
Furnace: 80% AFUE	-	$ -	$ -	$ -
Air Conditioner: 13 SEER	-	$ -	$ -	$ -
R-6 Attic Ducts (from R-8)	Downgrade	$ (325)	$ (225)	$ (275)
Reduced Duct Leakage/Testing (HERS)	-	$ -	$ -	$ -
No Water Heating Calculation Allowed for Addition Alone	-	$ -	$ -	$ -
Total Incremental Cost of Energy Efficiency Measures:		**$ 405**	**$ 865**	**$ 635**
Total Incremental Cost per Square Foot:		**$ 0.31**	**$ 0.67**	**$ 0.49**

15% Better Than Title 24 Option B **1295 sf** **Climate Zone 3**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-30 Roof w/ Radiant Barrier (from R-19 w/Radiant Barrier): 700 sf @ 0.25 to 0.35/sf	Upgrade	$ 175	$ 245	$ 210
R-15 Walls (from R-13): 1,212 sf @ $0.14 to $0.18/sf	Upgrade	$ 170	$ 218	$ 194
R-19 Raised Floor (from R-13): 700 sf @ $0.10 to $0.25	Upgrade	$ 70	$ 175	$ 123
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	$ -	$ -	$ -
Furnace: 90% AFUE (from 80% AFUE)	Upgrade	$ 500	$ 1,000	$ 750
Air Conditioner: 13 SEER	-	$ -	$ -	$ -
R-6 Attic Ducts (from R-8)	Downgrade	$ (325)	$ (225)	$ (275)
Reduced Duct Leakage/Testing (HERS)	-	$ -	$ -	$ -
No Water Heating Calculation Allowed for Addition Alone	-	$ -	$ -	$ -
Total Incremental Cost of Energy Efficiency Measures:		**$ 590**	**$ 1,413**	**$ 1,001**
Total Incremental Cost per Square Foot:		**$ 0.46**	**$ 1.09**	**$ 0.77**

2.3 Low-rise Residential Building

Energy design descriptions of the high-rise residential prototypes which just meet the 2008 Title 24 Building Energy Efficiency Standards:

Low-rise Multi-family Residential: 2-story 8,442 square feet, 8 units, 12.5% glazing

Option 1

Energy Efficiency Measures
R-38 Roof w/ Radiant Barrier
R-13 Walls
R-0 Slab on Grade
Low E2 Vinyl Windows, U=0.36, SHGC=0.30
(8) Furnaces: 80% AFUE
(8) Air Conditioners: 13 SEER
R-6 Attic Ducts
(8) 40 Gallon Gas Water Heaters: EF=0.62

Option 2

Energy Efficiency Measures
R-38 Roof w/ Radiant Barrier
R-13 Walls
R-0 Slab on Grade
Low E2 Vinyl Windows, U=0.36, SHGC=0.30
(8) Furnaces: 80% AFUE
Air Conditioners: None
R-6 Attic Ducts
(8) 40 Gallon Gas Water Heaters: EF=0.62

Energy Measures Needed to Meet the City's Ordinance

The following energy features have been modified from the Title 24 set of measures so that the house design uses 15% less TDV energy than the corresponding Title 24 base case design per the 2008-2011 GreenPoint Rated minimum energy requirement. The incremental first cost to provide that measure in comparison with the equivalent base case measure is listed to the right.

The incremental energy improvements specified above to meet the proposed Ordinance requirements are variables selected by designer, builder or owner. There are a number of considerations in choosing the final mix of energy measures including first cost, aesthetics, maintenance and replacement.

15% Better Than Title 24 Base Case, Option A **8442 sf** **Climate Zone 4**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-38 Roof w/ Radiant Barrier	-	$ -	$ -	$ -
R-19 Walls (from R-13): 10,146 sf @ $0.31 to $0.54/sf	Upgrade	$ 3,145	$ 5,479	$ 4,312
R-0 Slab on Grade	-	$ -	$ -	$ -
Housewrap: 10,146 sf @ $0.50 to 0.75/sf	Upgrade	$ 5,073	$ 7,610	$ 6,341
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	$ -	$ -	$ -
(8) Furnaces: 80% AFUE	-	$ -	$ -	$ -
(8) Air Conditioners: 13 SEER	-	$ -	$ -	$ -
R-6 Attic Ducts	-	$ -	$ -	$ -
(8) 40 Gallon Gas Water Heaters: EF=0.63 (from 0.62 EF)	Upgrade	$ -	$ 600	$ 300
Total Incremental Cost of Energy Efficiency Measures:		**$ 8,218**	**$ 13,688**	**$ 10,953**
Total Incremental Cost per Square Foot:		**$ 0.97**	**$ 1.62**	**$ 1.30**

15% Better Than Title 24 Base Case, Option B **8442 sf** **Climate Zone 4**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-30 Roof w/ Radiant Barrier (from R-38 w/Radiant Barrier): 4,221 sf @ $0.20 to $0.15/sf	Downgrade	$ (844)	$ (633)	$ (739)
R-21 Walls (from R-13): 10,146 sf @ $0.45 to $0.70/sf	Upgrade	$ 4,566	$ 7,102	$ 5,834
R-0 Slab on Grade	-	$ -	$ -	$ -
Housewrap: 10,146 sf @ $0.50 to 0.75/sf	Upgrade	$ 5,073	$ 7,610	$ 6,341
Low E2 Vinyl Windows, U=0.36, SHGC=0.30	-	$ -	$ -	$ -
(8) Furnaces: 80% AFUE	-	$ -	$ -	$ -
(8) Air Conditioners: 13 SEER	-	$ -	$ -	$ -
R-6 Attic Ducts	-	$ -	$ -	$ -
(8) 40 Gallon Gas Water Heaters: EF=0.62	-	$ -	$ -	$ -
Total Incremental Cost of Energy Efficiency Measures:		**$ 8,795**	**$ 14,079**	**$ 11,437**
Total Incremental Cost per Square Foot:		**$ 1.04**	**$ 1.67**	**$ 1.35**

Renovations or Alterations Covering ≥ 50% of Existing Building

For renovations or alterations in low-rise multifamily buildings, the ordinance references the requirements of GreenPoint Rated. The energy requirement for GPR for Existing Homes and Existing Multifamily is normally achieved through HERS 2 energy rating system. However, Table B connected to the ordinance makes clear that a building in this category must exceed the 2008 Title 24 standards by at least 15%. The cost-effectiveness of this requirement should be essentially self-evident for the following reasons:

(1) Upgrades of lighting, plumbing or interior finishes are generally made in conjunction with upgrades in water heating, mechanical and, in many cases, improved insulation (if not windows). Making these sorts of changes in the proposed building will achieve an overall energy performance of 15% better than the Title 24 standard design without having to target additional measures to improve energy efficiency.

(2) Incremental savings going from the existing building conditions to the new energy measures will generally be much larger than the savings associated with the case study above (in Section 2.3). Therefore, cost-effectiveness of this section of the ordinance is likely to be substantially greater than for new construction.

2.4 High-Rise Residential Building

Energy design descriptions of the high-rise residential prototypes which just meet the 2008 Title 24 Building Energy Efficiency Standards:

High-rise Residential: 4-story 36,800 sf, 40 units,
Window Wall Ratio = 35.2%

Energy Efficiency Measures
R-30 Roof
R-19 Metal Stud Walls
R-0 Raised Slab
Low E2 Vinyl Windows, U=0.36, SHGC=0.35
Room PTACs: HSPF=7.2, EER=10.2 (No Ducts)
Central DHW Boiler, AFUE=82.7%

High-rise Residential Energy Measures Needed to Meet the City's Ordinance.

Incremental energy efficiency measures to meet the Ordinance have been evaluated for the above high-rise residential buildings. The following features have been modified from the Title 24 measures so that these buildings use at least 15% less TDV energy than the corresponding base case design. The incremental first cost to provide each measure in comparison with the equivalent base case measure is listed to the right in the following tables.

15% Better Than Title 24 Base Case, Option A **36800 sf**

Energy Efficiency Measures		Change Type	Incremental Cost Estimate Min	Max	Avg
R-30 Cool Roof (Reflectance=0.70, Emmittance=0.75); 9,200 sf @ $0.25 - $0.40/sf		Upgrade	$ 2,300	$ 3,680	$ 2,990
R-19 Metal Stud Walls		-	$ -	$ -	$ -
R-0 Raised Slab		-	$ -	$ -	$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.25 6,240 sf @ $1.40 - $1.60/sf		Upgrade	$ 8,736	$ 9,984	$ 9,360
Room PTACs: HSPF=7.84, EER=11.2 (No Ducts) units @ $150 - $250/unit	80	Upgrade	$ 12,000	$ 20,000	$ 16,000
Central DHW Boiler, AFUE=82.7%		-	$ -	$ -	$ -
Total Incremental Cost of Energy Efficiency Measures:			**$ 23,036**	**$ 33,664**	**$ 28,350**
Total Incremental Cost per Square Foot:			**$ 0.63**	**$ 0.91**	**$ 0.77**

15% Better Than Title 24 Base Case, Option B **36800 sf**

Energy Efficiency Measures	Change Type	Incremental Cost Estimate		
		Min	Max	Avg
R-30 Roof	-	$ -	$ -	$ -
R-19 Metal Stud Walls	-	$ -	$ -	$ -
R-0 Raised Slab	-	$ -	$ -	$ -
Low E2 Vinyl Windows, U=0.36, SHGC=0.25 6,240 sf @ $1.40 - $1.60/sf	Upgrade	$ 8,736	$ 9,984	$ 9,360
Room PTACs: HSPF=7.84, EER=11.2 (No Ducts) 80 units @ $150 - $250/unit	Upgrade	$ 12,000	$ 20,000	$ 16,000
Central DHW Boiler, AFUE=94%: 2 @ $2000 - $3000 each	Upgrade	$ 3,000	$ 6,000	$ 4,500
Total Incremental Cost of Energy Efficiency Measures:		**$ 23,736**	**$ 35,984**	**$ 29,860**
Total Incremental Cost per Square Foot:		**$ 0.65**	**$ 0.98**	**$ 0.81**

2.5 Nonresidential Buildings

The following measures were first evaluated so that the building just meets the 2008 standards as follows:

(A) 10,580 sf 1-story building, 24.1% Window Wall Ratio glazing area

- R-30 attic insulation, R-19 in metal frame exterior walls, slab-on-grade 1st floor;
- NFRC-rated Low-E windows: U-factor=0.50, SHGCc=0.38 (e.g., Viracon VE 1-2M) w/ no exterior shading
- Lighting = 0.852 w/sf: 120 2-lamp 4' T8 fixtures @ 62w each and 100 26w CFLs @ 26 w each; 6 50w-halogens; no lighting controls
- (4) 7.5-ton Packaged DX units: 11.0 EER; 80% AFUE; all standard efficiency fan motors
- Ducts in conditioned space, R-4.2 duct insulation
- Domestic hot water assumed to be standard gas water heater

LEED vs. Title 24 Building Energy Performance

The United States Green Building Council's LEED rating system uses a different metric than Title 24 does in establishing a proposed building's energy performance with respect to the baseline energy performance. LEED 2009 requires the use of the Energy Cost Budget (ECB) method to demonstrate that the annual energy cost of the proposed building is at least 10% less than the annual energy cost of (a) the ASHRAE 90.1-2007 baseline reference building; or (b) the 2005 Title 24 standard design. In either case, all site energy must be a part of the LEED calculation of annual energy cost which includes exterior lighting, interior lighting, process loads and receptacle loads.

By comparison, the energy performance metric used in the 2008 Title 24 Building Energy Efficiency Standards is Time Dependent Valuation (TDV) Energy measured in KBtu/sf-yr. Process, receptacle and lighting loads in high-rise residential buildings are fixed in both the Standard Design and the Proposed Building within the performance calculation; and as such, are considered unregulated energy use components.

A current study for PG&E by Gabel Associates indicates that there is no simple or consistent correlation between a building that meets the 2008 Title 24 Building Energy Efficiency Standards and the extent to which it compares to the LEED baseline annual energy cost. To resolve this apparent dilemma, Palo Alto's energy ordinance (the companion to its green building ordinance) creates a level playing field for all nonresidential buildings by requiring that they must reduce Title 24 TDV energy use by at least 15%. This is the same approach taken by the City of San Francisco and almost all other jurisdictions implementing green building ordinances under the 2008 Title 24 standards whereby 15%-better-than-Title 24 is considered equivalent to meeting the LEED 2009 energy prerequisite.

Energy Measures Needed to Exceed the 2008 Standards

The following energy efficiency features have been modified from the above Title 24 set of measures so that the proposed design uses 15% less TDV energy than the 2008 standards. The added first cost of each measure compared with the equivalent 2008 Title 24 design measure is listed to the right in the tables below, as well as the sum of all incremental costs.

(A1) 10,580 sf building: Reduction in 2008 T24 TDV Energy by 15%

• Lighting = 0.693 w/sf: 120 2-lamp 4' T8 fixtures with high efficiency instant start ballasts and premium T8 lamps, 50 input watts @$35.00 - $60.00/fixture	$ 4,200 - 7,200
• 30 (25% of) T8 fixtures on 15 occupant sensors, small offices: @$75.00 - $100.00 each	$ 1,125 - 1,500
• U=0.50, SHGCc=0.31 (e.g., Viracon VE 2-2M) 1,960 sf @$2.00 - 3.00/sq.ft.	$ 3,920 - 5,880
• R-30 cool roof Reflectance=0.70, Emmittance=0.75 10,580 sf @ $0.35 - $0.50/sf	$ 3,705 - 5,290
Total incremental cost of Ordinance energy measure:	**$ 12,950 - 19,870 Avg = $16,410**
Incremental cost in $/SF:	**$ 1.22 to $1.88/sq.ft. Avg = $1.55 /sf**

(A2) 10,580 sf building: (Reduction in 2008 T24 TDV Energy by 10%

• Lighting = 0.693 w/sf: 120 2-lamp 4' T8 fixtures with high efficiency instant start ballasts and premium T8 lamps, 50 input watts @$35.00 - $60.00/fixture	$ 4,200 - 7,200
• (4) Global Energy Group 1400 Series 7.5-ton Packaged DX, EER = 13.0 @$1950 - $2450 each	$ 7,800 - 9,800
• R-30 cool roof Reflectance=0.70, Emmittance=0.75 10,580 sf @ $0.35 - $0.50/sf	$ 3,705 - 5,290
Total incremental cost of Ordinance energy measure:	**$ 15,705 - 22,290 Avg = $18,998**
Incremental cost in $/SF:	**$ 1.48 to $2.11/sq.ft. Avg = $1.80 /sf**

The following measures were first evaluated so that the building just meets the 2008 standards as follows:

52,900 sf 5-story building, 29.1% Window Wall Ratio glazing area

(A) 52,900 sf 5-story office building which just meet Title 24:

- R-30 attic insulation, R-19 in metal frame exterior walls, slab-on-grade 1st floor;
- NFRC-rated Low-E windows: U-factor=0.50, SHGCc=0.38 (e.g., Viracon VE 1-2M) w/ 2' overhang on 1st floor only
- Lighting = 0.909 w/sf: 720 2-lamp 4' T8 fixtures w/ high efficiency ballasts @ 58w each and 230 26w CFLs @ 26 w each; no lighting controls
- 4 identical Packaged VAV units: Aaron 25 ton, EER=10.4, 10,000 CFM, standard efficiency fan motors, 30% VAV boxes w/ reheat
- Ducts in conditioned space, R-4.2 duct insulation
- Hot water assumed to be standard gas water heater or boiler

Energy Measures Needed to Exceed the 2008 Standards

The following energy efficiency features have been modified from the above Title 24 set of measures so that the proposed design uses 15% less TDV energy than the 2008 standards. The added first cost of each measure compared with the equivalent 2008 Title 24 design measure is listed to the right in the table below, and the sum of all incremental costs is listed.

(A1) 52,900 sf building: Reduction in 2008 T24 TDV Energy by 15%

• (5) Trane 25 ton units, EER=11.0 @ $9,000 to $13,000 each w/ premium fan motors	$ 45,000 - 65,000
• 10 NEMA Premium fan motors on supply & return fans	$ 750 - 1,250
• R-38 w/ Cool Roof 10,580 sf @ $0.40 - $0.50/sf	$ 4,235 - 5,290
• Installed LPD=0.785: 720 2-lamp 4' T8 fixtures w/ high eff. instant start ballasts and premium T8 lamps, 50w input @$10.00 - $20.00/fixture	$ 7,200 - 14,400
• Switch 20 (< 9%) of 26w CFLs to 18w CFLs	$ 0 - 0
• 100 occupant sensors controlling (2) 2-lamp T8 fixtures; @$75.00 - $100.00 each	$ 7,500 - 10,000
• R-21 in exterior walls: 20,730 sf @ $0.08 - $0.12/sf	$ 1,660 - 2,490
• U=0.50, SHGCc=0.31 (e.g., Viracon VE 2-2M) 8,500 sf @$2.00 - 3.00/sq.ft.	$ 17,000 - 25,500
Total incremental cost of Ordinance energy measure:	**$ 83,345 - 123,930 Avg = $103,638**
Incremental cost in $/SF:	**$ 1.58 to $2.34/sq.ft. Avg = $1.96 /sf**

3.0 Cost Effectiveness

The summary of results in this section are based upon the following assumptions:

- Incremental site electricity (kWh) and natural gas (therms) saved per year as calculated using the state-approved energy compliance software for the 2008 Building Energy Efficiency Standards, EnergyPro Version 5 and Micropas Version 8.

- Average utility rates of $0.14/kWh for electricity and $1.67/therm for natural gas in current constant dollars as provided by City of Palo Alto Utilities

- No change (i.e., no inflation or deflation) of utility rates in constant dollars over time as per City of Palo Alto Utilities

- No increase in summer temperatures, even though recent scientific studies suggest that global climate change will increase temperatures in the Western United States, which in turn will increase energy use associated with air conditioning

The Simple Payback data includes a cost-effectiveness analysis of the City's ordinance with respect to each case study building design and assumes:

- No external cost of global climate change -- and corresponding value of additional investment in energy efficiency and CO2 reduction – is included

- The cost of money invested in the incremental cost of energy measures is not included.

- City of Palo Alto Utilities incentives that may be applicable in some cases are not included in the cost-effectiveness data.

3.1 New Single Family Homes

Building Description	Average Incremental First Cost ($)	Net Incremental Annual Energy Cost Savings ($)	Simple Payback (years)
1,705 sf (OptA-15%)	$1,915	$107	17.9
1,705 sf (OptB-15%)	$1,840	$110	16.7
Averages:	$1,877	$109	17.3

Annual Reduction in CO2-equivalent: 0.41 lbs./sq.ft.- year

Building Description	Average Incremental First Cost ($)	Net Incremental Annual Energy Cost Savings ($)	Simple Payback (years)
2,682 sf (OptA-15%)	$1,525	$165	9.2
2,682 sf (OptB-15%)	$2,686	$177	15.2
Averages:	$2,106	$171	12.2

Annual Reduction in CO2-equivalent: 0.41 lbs./sq.ft.- year

Building Description	Average Incremental First Cost ($)	Net Incremental Annual Energy Cost Savings ($)	Simple Payback (years)
5,074 sf (OptA-15%)	$4,314	$223	19.3
5,074 sf (OptB-15%)	$4,027	$218	18.5
Averages:	$4,170	$221	18.9

Annual Reduction in CO2-equivalent: 0.28 lbs./sq.ft.- year

3.2 Addition to Existing Homes

Building Description	Total Incremental First Cost ($)	Net Incremental Annual Energy Cost Savings ($)	Simple Payback (years)
1,295 sf Add (OptA -15%)	$635	$36	17.5
1,295 sf Add (OptB -15%)	$1,002	$41	24.4
Averages:	$818	$39	21.0

Annual Reduction in CO2-equivalent: 0.24 lbs./sq.ft.- year

3.3 Low-rise Multifamily Building

Building Description	Total Incremental First Cost ($)	Net Incremental Annual Energy Cost Savings ($)	Simple Payback (years)
8,442 sf (OptA-15%)	$10,953	$461	23.8
8,442 sf (OptB-15%)	$11,437	$454	25.2
Averages:	$11,195	$458	24.5

Annual Reduction in CO2-equivalent: 0.32 lbs./sq.ft.- year

3.4 High-rise Residential Building

Building Description	Average Incremental First Cost ($)	Net Incremental Annual Energy Cost Savings ($)	Simple Payback (years)
36,800 sf (Opt-A -15%)	$28,350	$2,106	13.5
36,800 sf (Opt-B -15%)	$29,860	$2,855	10.5
Averages:	$29,105	$2,481	12.0

Annual Reduction in CO2-equivalent: 0.32 lbs./sq.ft.- year

3.5 Nonresidential Buildings

Building Description	Total Incremental First Cost ($)	Net Incremental Annual Energy Cost Savings ($)	Simple Payback (years)
10,580 sf (A1)	$7,013	$1,534	4.6
10,580 sf (A2)	$13,298	$1,638	8.1
Averages:	$10,155	$1,586	6.3

Annual Reduction in CO2-equivalent: 0.48 lbs./sq.ft.- year

Building Description	Total Incremental First Cost ($)	Net Incremental Annual Energy Cost Savings ($)	Simple Payback (years)
52,900 sf (A1)	$71,563	$6,781	10.6

Annual Reduction in CO2-equivalent: 0.38 lbs./sq.ft.- year

Conclusions

In considering the issue of energy cost-effectiveness, it's worth noting a few points which put the above data in a slightly different context.

1. First cost data for incremental (additional) energy measures is generally conservative since average of a low-value and a high-value is used. Builders could focus on obtaining materials and equipment at the lower end costs which will reduce the simple paybacks.

2. No serious attempt was made in the case studies presented here to optimize cost-effectiveness by performing multiple computer runs with different combinations of energy measures. That approach would likely come into play more in actual projects where reducing first costs to meet a specified energy performance level may be driving force in the design process.

3. As noted in the above assumptions, the predicted rise in temperatures in California over the next 20 years from global climate change has not been included. Increased cooling loads will increase the energy savings for cooling system efficiencies and therefore also reduce simple paybacks.

Regardless of the individual building design, occupancy type and number of stories, it is reasonable to conclude (a) that the paybacks are equal to or less than useful life of the energy measures needed to meet the ordinance energy requirements; and (b) that, therefore, the incremental improvements in overall annual energy performance of buildings meeting the City's ordinance are cost-effective. However, each building's specific design, occupancy type and the design choices used to meet the state's energy code -- and go beyond it to meet the requirements of the City's ordinances -- may allow for a large range of incremental first costs and paybacks. As is the case in meeting the requirements of the state's Title 24 energy standards, a permit applicant complying with the energy requirements of Palo Alto's energy efficiency ordinance should carefully analyze building energy performance to reduce incremental first cost and payback for the required additional energy efficiency measures.

4.0 Implementation Plan

The implementation of the City of Palo Alto energy ordinance for residential buildings is a simple verification that the performance CF-1R form for low-rise residential buildings or the PERF-1 for high-rise residential buildings demonstrates that the proposed building exceeds
Title 24 standards by at least 15%. If the building is to receive additional energy points under GreenPoint Rated (GPR) beyond the minimum 30 points, then the %-better-than-Title 24 is specified.

For nonresidential buildings, LEED requirements apply. However, the City's energy ordinance requires, as applied to certain categories of new construction, a minimum energy performance of exceeding the 2008 Title 24 standards by at least 15%.

The City of Palo Alto plan review will involve:

(a) Verifying the occupancy type(s) and scope of work to determine whether and how the Ordinance applies;

(b) Checking the drawings, specifications and Title 24 documentation under the 2008 Building Energy Efficiency Standards; and,

(c) Checking any additional special compliance forms needed to demonstrate compliance with the Ordinance.

Field inspection will be essentially identical to working with the 2008 standards, with the inclusion of the possible inspection of a solar PV system included as extra credit under GPR or LEED.

5.0 Text of Green Building and Energy Ordinances

The following pages include the text of Palo Alto's revised Green Building and Energy Ordinances approved by the City Council at the introduction on October 19, 2009.

ORDINANCE _____

ORDINANCE OF THE CITY COUNCIL OF THE CITY OF PALO ALTO AMENDING TITLE 18 (ZONING) OF THE PALO ALTO MUNICIPAL CODE TO ADD A NEW CHAPTER 18.44 (GREEN BUILDING REGULATIONS)

WHEREAS, the City of Palo Alto's (City) Comprehensive Plan sets forth goals for preserving and improving the City's natural and built environment, protecting the health of its residents and visitors, conserving water and energy, and fostering its economy; and

WHEREAS, the City Council of the City of Palo Alto has identified Environmental Protection as one of its top four goals, and green building is a key component of environmental protection; and

WHEREAS, green building design, construction, restoration, operation, and maintenance can have a significant positive effect on energy, water, and resource conservation, waste management and pollution generation, and the health and productivity of a property's residents, workers, and visitors over the life of a building and/or site; and

WHEREAS, the provisions of California Assembly Bill 32 (Global Warming Solutions Act) require actions on the part of State and local governments to significantly reduce greenhouse gas (GHG) emissions such that statewide GHG emissions in 2020 are lowered to 1990 levels; and

WHEREAS, failure to address and significantly reduce greenhouse gas emissions could result in rises in sea level, including in San Francisco Bay, that could put at risk Palo Alto homes and businesses, public facilities, and Highway 101 (Bayshore Freeway); and

WHEREAS, green building regulations comprise an important component of a whole systems approach to the City's sustainability program related to building and land development, other components of which include but are not limited to requirements for: disposal of construction and demolition debris, storm water quality and flood protection, tree protection, water conservation, recyclable materials storage, parking lot landscaping, and transportation demand management.

Now, the Council of the city of Palo Alto does ORDAIN as follows:

SECTION 1. Findings. The City Council finds as follows:

A. The City's Climate Protection Plan (CPP), adopted by the City Council on December 3, 2007, identifies green building as an important approach to reducing greenhouse gases generated in the Palo Alto community. The CPP notes that building construction and maintenance accounts for approximately 38% of U.S. greenhouse gas emissions (U.S. Department of Energy) and approximately 40% of the energy use in the Palo Alto community. Buildings

also account for much of the 14% of emissions that are generated by waste materials; and

B. Green building and landscape design, construction, operations and maintenance techniques are increasingly widespread in residential and commercial building construction, and green building benefits can be spread throughout the systems and features of a building, such that green buildings can include: the use of certified sustainable wood products and high-recycled content products; reuse of existing facilities and recycling and salvage; reduced demands on heating and cooling systems; increased energy efficiency; enhancement of indoor air quality; reduced per capita demand on water resources and infrastructure; and the installation of alternative and renewable energy systems; and

C. At the national and state levels, the U.S. Green Building Council has taken the lead in promoting and defining commercial green building by developing the Leadership in Energy and Environmental Design (LEED) Rating System™; and

D. At the state level, Build It Green has taken the lead in promoting and defining residential green building by developing the GreenPoint Rated Rating System™; and

E. Nothing in this ordinance is intended to duplicate, contradict, or infringe upon provisions of state law, including the California Building Standards Code. The ordinance and the associated checklists provide many opportunities to achieve required points and credits that do not impact areas where state law has established building standards.

F. On April 9, 2008, the Planning and Transportation Commission held a duly noticed public hearing and heard testimony regarding a green building ordinance, and recommended adoption of the green building ordinance to the City Council.

G. On May 12, 2008, the City Council held a duly noticed public hearing and heard testimony regarding the proposed green building ordinance.

H. Because the design, restoration, construction, and maintenance of buildings and structures within the City can have a significant impact on the City's environment, greenhouse gas emissions, resource usage, energy efficiency, waste management and the health and productivity of residents, workers and visitors over the life of the building, requiring commercial and residential projects to incorporate green building measures is necessary and appropriate to achieve the public health and welfare benefits of green building.

//

SECTION 2. A new Chapter 18.44 (Green Building Regulations) of Title 18 (Zoning) of the Palo Alto Municipal Code is hereby added to read as follows:

Chapter 18.44

GREEN BUILDING REGULATIONS

Sections:

18.44.010 Purpose.

The purpose of this Chapter is to enhance the public health and welfare by promoting the environmental and economic health of the City through the design, construction, maintenance, operation and deconstruction of buildings and other site development by incorporating green building practices into all development. The green building provisions referred to in this Chapter are designed to achieve the following goals:

(a) Increase energy efficiency in buildings;

(b) Encourage water and resource conservation;

(c) Reduce waste generated by construction projects;

(d) Provide durable buildings that are efficient and economical to own and operate;

(e) Promote the health and productivity of residents, workers, and visitors to the city; and

(f) Recognize and conserve the energy embodied in existing buildings.

18.44.020 Applicability

This ordinance applies to all projects defined as "Covered Projects," as defined below, except that it shall not apply to any project for which a planning entitlement application (except for a preliminary architectural review application) or building permit application has been submitted prior to the effective date of this ordinance. However, commercial covered projects with planning applications submitted after December 3, 2007, but for which building permits have not yet been issued as of the effective date of this ordinance, shall be subject to compliance with this Chapter.

18.44.030 Definitions.

The following terms shall have the ascribed definition for the purposes of applying the criteria of this chapter. When the definition differs from a definition in Section 18.04 of this code, the provisions of this section shall apply.

(a) "Addition" means new construction square footage added to an existing structure.

(b) "Applicant" means any entity that applies to the city for the applicable permits to undertake any covered project within the city, or any subsequent owner of the site.

(c) "Compliance official" means the Director of Planning and Community Environment or his or her designee.

(d) "Compliance threshold" means the minimum number of points or rating level of a green building rating system that must be attained for a particular Covered Project, as outlined in the Standards for Compliance in Section 18.44.040.

(e) "Covered project" means any planning entitlement application(s) or building permit application(s) for commercial (nonresidential) new construction or renovations, or for any multi-family or single-family or two-family residential new construction or renovation subject to the Standards for Compliance outlined in Section 18.44.040.

(f) "Good faith effort" means a project that has not met the required compliance threshold, but for extenuating reasons or reasons beyond the control of the applicant, the Compliance Official has found the project meets the good faith effort provisions of Section 18.44.060.

(g) "Green building" means a whole systems approach to the design, construction and operation of buildings that substantially mitigates the environmental, economic, and social impacts of buildings. Green building practices recognize the relationship between the natural and built environments and seek to minimize the use of energy, water and other natural resources and provide a healthy, productive indoor environment.

(h) "Green building project checklist" means a checklist or scorecard developed for the purpose of calculating a green building rating.

(i) "Green building rating system" means the rating system associated with specific green building criteria and used to determine compliance thresholds, as outlined in the Standards of Compliance adopted by City Council resolution. Examples of rating systems include, but are not limited to, the LEED and GreenPoint Rated systems.

(j) "GreenPoint Rated" means a residential green building rating system developed by the Build It Green organization.

(k) "GreenPoint Rated Verification" means verification of compliance by a certified GreenPoint Rater, resulting in green building certification by Build It Green including green points allocation across all of the resource categories.

(l) "LEED®" means the "Leadership in Energy and Environmental Design" green building rating system developed by the U.S. Green Building Council.

(m) "LEED®/USGBC Verification" means verification to meet the standards of the U.S. Green Building Council (USGBC) and resulting in LEED certification of the project by the USGBC.

(n) "Mixed use" means the construction of a building or buildings that include both commercial and residential uses.

(o) "Multi-family residential" means a building containing three or more attached dwelling units.

(p) "New construction, commercial (nonresidential)" means the construction of a new or replacement retail, office, industrial, warehouse, service, or similar building(s), or additions to such building(s).

(q) "New construction, residential" means the construction of a new or replacement single-family or two-family dwelling unit or of new or replacement multi-family residential building(s), or additions to such building(s).

(r) "Qualified green building professional" means a person trained through the USGBC as a LEED accredited professional or through Build It Green as a certified green building professional, or similar qualifications if acceptable to the Compliance Official. For projects requiring "self-verification," the project architect or designer is considered a qualified green building professional.

(s) "Renovation" means any rehabilitation, repair, remodeling, change, or modification to an existing building, where changes to floor area and the footprint of the building are negligible. The valuation of renovation improvements shall be determined by the Director of Planning and Community Environment, upon recommendation of the Chief Building Official. The Chief Building Official may exclude from such valuation the cost of (a) seismic upgrades, (b) accessibility upgrades, or (c) photovoltaic panels or other solar energy or similar devices exterior to the building. Renovation valuation thresholds identified in the Standards for Compliance shall be adjusted annually to reflect changes in the City's valuation per square foot for new construction in Palo Alto, using valuations in effect as of July 1, 2008, as the base index.

(t) "Self verification" means verification by the project architect, designer or a qualified green building professional certifying that the project has met the standards and has

attained the compliance threshold as indicated for the Covered Project type as set forth in the Standards for Compliance outlined in Section 18.44.040.

(u) "Single-family or two-family residential" means a single detached dwelling unit or two units in a single building.

(v) "Square footage," for the purposes of calculating commercial, multi-family residential, and single-family and two-family new construction square footage, means all new and replacement square footage, including basement areas (7 feet or greater in height) and garages, except that unconditioned garage space shall only count as 50% of that square footage. Areas demolished shall not be deducted from the total new construction square footage.

(w) "Threshold Verification by LEED AP" means verification by a LEED accredited professional certifying that each LEED checklist point listed was verified to meet the requirements to achieve that point. The LEED AP shall provide supporting information from qualified professionals (e.g. civil engineer, electrical engineer, Title 24 consultant, commissioning agent, etc.) to certify compliance with each point on the checklist. Documentation of construction consistent with building plans calculated to achieve energy compliance is sufficient verification in lieu of post-construction commissioning.

18.44.040 Standards for Compliance.

The City Council shall establish by resolution, and shall periodically review and update as necessary, Green Building Standards for Compliance. The Standards for Compliance shall include, but are not limited to, the following:

(a) The types of projects subject to regulation (Covered Projects);

(b) The green building rating system to be applied to the various types of projects;

(c) Minimum thresholds of compliance for various types of projects; and

(d) Timing and methods of verification of compliance with these regulations.

The Standards for Compliance shall be approved after recommendation from the Director of Planning and Community Environment, who shall refer the Standards for recommendation by the Architectural Review Board, prior to Council action.

18.44.050 Incentives for Compliance.

(a) In addition to the required standards for compliance, the City Council may, through ordinance or resolution, enact financial, permit review process, or zoning incentives and/or award or recognition programs to further encourage higher levels of green building compliance for a project.

(b) For residential projects, the number of GreenPoint checklist points required shall be reduced by:

(1) 5 points for maintaining a minimum of 75% of existing walls, floors, and roof of a structure;

(2) 5 points (in addition to (1) above) for maintaining a minimum of 95% of existing walls, floors, and roof of a structure; and/or

(3) 10 points (in addition to (1) and/or (2) above) when applied to a structure that is designated on the City's Historic Inventory as a Category 1 or Category 2 historic structure as defined in Section 16.49.020 of this code or any contributing structure located within a locally designated historic district, and Category 3 and 4 historic structures on the local inventory and those structures eligible for the National Register of Historic Places, subject to determination by the Historic Resources Board that such additions and/or renovations are consistent with the Secretary of the Interior's Standards for Rehabilitation.

18.44.060 Administrative Procedures and Promulgation of Implementing Regulations.

(a) The Director of Planning and Community Environment shall promulgate any rules and regulations necessary or appropriate to achieve compliance with the requirements of this Chapter. The rules and regulations shall provide, at a minimum, for the incorporation of green building requirements of this Chapter into checklist submittals with planning entitlement and building permit applications, and supporting design, construction, or development documents to demonstrate compliance with this Chapter.

(b) The procedures for compliance documentation shall include, but not be limited to, the following:

(1) Preliminary Documentation. Applicants for a Covered Project are encouraged, but not required, to meet with the Compliance Official or his or her designated staff, in advance of submittal of an application, to determine required green building thresholds for compliance and to review the proposed green building program and details to achieve compliance.

(2) Discretionary Planning Entitlements. Upon submittal of an application for any discretionary planning entitlement for any Covered Project, including but not limited to Individual Review, Major or Minor Architectural Review, Site and Design, Planned Community, Conditional Use Permit, or Variance requests, application materials shall include the appropriate completed checklists, as required by the Standards for Compliance specified in Section 18.44.040, accompanied by a text description of the proposed green building program and expected measures and milestones for compliance. The Compliance Official may allow the use of alternative

checklists for historic buildings or for buildings that retain or re-use substantial portions of the existing structure.

(3) Building Plan Check Review. Upon submittal of an application for a building permit, building plans for any Covered Project shall include a checklist and green building program description, reflecting any changes proposed since the planning entitlement phase (if a planning entitlement was required). The checklist shall be incorporated onto a separate plan sheet included with the building plans. A qualified green building professional shall provide evidence of adequate green building compliance or documentation to the Compliance Official to satisfy the requirements of the Standards for Compliance outlined in Section 18.44.040, prior to issuance of a building permit.

(4) Final Building Inspection, Verification, and Occupancy. Prior to final building inspection and occupancy for any Covered Project, a qualified building professional shall provide evidence of adequate green building compliance or documentation to the Compliance Official to satisfy the requirements of the Standards for Compliance outlined in Section 18.44.040. This information shall include, but is not limited to:

i. Documentation that verifies incorporation of the design and construction related credits specified in the project approval for the Covered Project;

ii. A letter from the qualified green building professional that certifies that the Covered Project has been constructed in accordance with the approved green building project checklist;

iii. Any additional documentation that would be required by the LEED reference guide for LEED certification (if required), or by the GreenPoint Rated manuals for GreenPoint Rated certification (if required); and

iv. Any additional information that the applicant believes is relevant to determining that a good faith effort has been made to comply with this chapter.

(5) Final Determination of Compliance and Good Faith Effort to Comply. Prior to the scheduling of a final building inspection for a Covered Project, the Compliance Official shall review the documentation submitted by the applicant, and determine whether the applicant has achieved the required compliance threshold as set forth in the Standards for Compliance outlined in Section 18.44.040 and/or demonstrate that measures are in place to assure compliance not later than one year after approval of final building inspection. If the Compliance Official determines that the applicant has met the requirements of Section 18.44.040 for the project, the final building inspection may proceed, provided the Covered Project has

received approval of all other inspections required by the Chief Building Official. If the Compliance Official determines that the required green building rating has not been achieved, the Compliance Official shall find one of the following:

i. Good Faith Effort to Comply: When an applicant submits a request in writing to the Compliance Official for approval of a good faith effort to comply, the Compliance Official shall determine that the applicant has made a good faith effort to comply with this chapter when finding that either a) the cost for providing green building documentation or assuring compliance is disproportionate to the overall cost of the project, or b) the green building materials and technologies on the green building checklist are no longer available or not yet commercially available, or c) at least 80% of the required green point credits have been achieved, and measures are in place to assure full compliance not later than one year after approval of the final building inspection. Determination of a good faith effort to comply shall be made separately for each item on the green building project checklist. Granting of a good faith effort to comply for one item does not preclude the need for the applicant to comply with the other items on the green building checklist.

ii. Non-Compliant Project. If the Compliance Official determines that the applicant has not made a good faith effort to comply with this chapter, or if the applicant fails to submit the documentation required within the required time period, then the project shall be determined to be non-compliant, and the final inspection and approval for the project shall be withheld. A final inspection shall not take place until the applicant has implemented equivalent alternate measures approved by the Compliance Official or unless an exemption is granted for the project.

(6) Post Final Inspection Requirement. Not later than one year after approval of the final building inspection, the applicant or current owner shall submit to the Compliance Official documentation detailing compliance with the operation, efficiency, and conservation related credits from the approved checklist documentation for any Covered Project, if required by the Compliance Official. The applicant may also provide any additional information the applicant believes is relevant to determining its good faith efforts to comply with this chapter.

(7) Non-Compliance. If, as a result of any inspection, the City determines that the Covered Project does not or is unlikely to comply with the approved plans or green building checklist, a stop order shall be issued if the Compliance Official determines that continuation of construction activities will jeopardize the project's ability to meet the required compliance threshold. The stop order shall remain in effect until the Compliance

Official determines that the project will be brought into compliance with the approved plans and/or checklist.

(8) Interim Compliance Effort. For residential projects initiating construction not later than two years after the effective date of this ordinance, a good faith effort shall be deemed to have been made when at least 75% of the required minimum total green points and the GPR allocation of minimum points across all resource categories have been achieved prior to final building inspection, and adequate remaining checklist points are outlined to demonstrate that at least 90% of the minimum points and GreenPoint certification will be achieved not later than one year after final inspection. If 75% of the required minimum green points are not achieved prior to the request for final building inspection, the final inspection shall be withheld unless an exemption is granted by the Compliance Official.

(9) Lack of Inspectors. If the Compliance Official determines that there is a lack of third party or City inspectors available to perform green building inspections within a timely manner, the Compliance Official may allow self-verification of the project and determine that green building requirements have been met.

(c) The Compliance Official shall have the responsibility to administer and monitor compliance with the green building requirements set forth in this chapter and with any rules and regulations promulgated thereunder, and to grant exemptions from the requirements, where so authorized.

(d) Compliance with the provisions of this chapter shall be listed as a condition of approval on any Architectural Review or other discretionary permit approval, and on the building plans for building permit approval, for any Covered Project.

18.44.070 Hardship or Infeasibility Exemption.

(a) Exemption. If an applicant for a Covered Project believes that circumstances exist that make it a hardship or infeasible to meet the requirements of this Chapter, the applicant may request an exemption as set forth below. In applying for an exemption, the burden is on the Applicant to show hardship or infeasibility.

(b) Application. If an applicant for a Covered Project believes such circumstances exist, the applicant may apply for an exemption at the time of application submittal. The applicant shall indicate the maximum threshold of compliance he or she believes is feasible for the covered project and the circumstances that he or she believes create a hardship or make it infeasible to fully comply with this Chapter. Circumstances that constitute hardship or infeasibility include, but are not limited to the following:

(1) There is conflict with the compatibility of the green building rating system with other City goals, such as those requiring historic preservation;

(2) There is conflict with the compatibility of the green building rating system and the California Building Standards Code;

(3) There is conflict with the compatibility of the green building rating system and the City's Zoning Ordinance and/or Architectural Review criteria;

(4) The green building compliance standards do not include enough green building measures that are compatible with the scope of the covered project; and/or

(5) There is a lack of commercially available green building materials and technologies to comply with the green building rating system.

(c) Review by Architectural Review Board (ARB) and/or Historic Resources Board (HRB). For any covered project for which an exemption is requested and Architectural Review is required by the ARB, the ARB shall provide a recommendation to the Director regarding whether the exemption shall be granted or denied, along with its recommendation on the project. For any project for which an exemption is requested based on the historic character of the building or site, the Historic Resources Board (HRB) shall provide a recommendation to the Director regarding whether the exemption shall be granted or denied and shall determine whether the project is consistent with the Secretary of the Interior's Standards for Historic Rehabilitation.

(d) Granting of Exemption. If the Director determines that it is a hardship or is infeasible for the applicant to fully meet the requirements of this chapter based on the information provided, the Director shall determine the maximum feasible threshold of compliance reasonably achievable for the project. The decision of the Director shall be provided to the applicant in writing. If an exemption is granted, the applicant shall be required to comply with this chapter in all other respects and shall be required to achieve, in accordance with this chapter, the threshold of compliance determined to be achievable by the Director.

(e) Denial of Exemption. If the Director determines that it is reasonably possible for the applicant to fully meet the requirements of this chapter, the request shall be denied and the Director shall so notify the applicant in writing. The project and compliance documentation shall be modified to comply with this chapter prior to further review of any pending planning or building application.

(f) Council Review of Exemption. For any covered project that requires review and action by the City Council, the Council shall act to grant or deny the exemption, based on the criteria outlined above, after recommendation by the Director.

18.44.080 Appeal.

(a) Any aggrieved Applicant or person may appeal the determination of the Director regarding: (1) the granting or denial of an exemption pursuant to Section 18.44.070; or (2) compliance with any other provision of this ordinance.

(b) Any appeal must be filed in writing with the Department of Planning and Community Environment not later than fourteen (14) days after the date of the determination by the Director. The appeal shall state the alleged error or reason for the appeal.

(c) The appeal shall be processed and considered by the City Council in accordance with the provisions of Section 18.77.070(e) of the City of Palo Alto Municipal Code.

SECTION 3. Not later than one year after the effective date of the ordinance, a report shall be prepared for presentation to the Architectural Review Board, Historic Resources Board, Planning and Transportation Commission, and City Council regarding the results of implementation of the ordinance. The report shall include, but is not limited to, documentation of the number and types of projects subject to the ordinance, explanation of whether and how compliance was achieved, identification of any problems arising from implementation, the costs of enforcement, and any recommendations for revisions to the ordinance or accompanying resolution and Standards for Compliance tables.

SECTION 4. Severability. If any section of this ordinance, or part hereof, is held by a court of competent jurisdiction in a final judicial action to be void, voidable or unenforceable, such section, or part hereof, shall be deemed severable from the remaining sections of this ordinance and shall in no way affect the validity of the remaining sections hereof.

SECTION 5. The Council hereby finds this ordinance is categorically exempt from the requirements of the California Environmental Quality Act ("CEQA") pursuant to Section 15308 of the CEQA Guidelines because it is an action taken by a regulatory agency for the protection of the environment.

SECTION 6. This ordinance shall be effective on the thirty-first day after the date of its adoption.

INTRODUCED:

PASSED:

AYES:

NOES:

ABSTENTIONS:

ABSENT:

ATTEST: APPROVED:

_____
City Clerk

_____
Mayor

APPROVED AS TO FORM:

_____
City Manager

_____
Deputy City Attorney

_____
Director of Planning and
Community Environment

NOT YET APPROVED

Ordinance No. _____

Ordinance of the City Council of the City of Palo Alto Repealing Chapter 16.18 of the Palo Alto Municipal Code and Amending Title 16 to Adopt a New Chapter 16.18 Establishing Local Energy Efficiency Standards for Certain Buildings and Improvements Covered by the 2008 California Energy Code

The City Council of the City of Palo Alto does ORDAIN as follows:

SECTION 1. Findings. The City Council finds that:

1. The City of Palo Alto's (City) Comprehensive Plan sets forth goals for preserving and improving the City's natural and built environment, protecting the health of its residents and visitors, conserving water and energy, and fostering its economy; and

2. The City Council has identified Environmental Protection as one of its top three goals, and energy efficiency is a key component of environmental protection; and

3. The City's Climate Protection Plan, adopted by the City Council on December 3, 2007, states that natural gas and electricity use within the City accounts for approximately 310,000 metric tons of carbon dioxide emissions annually, or 42.5% of total annual City-wide emissions; and

4. The provisions of California Assembly Bill 32 (Global Warming Solutions Act) require actions on the part of State and local governments to significantly reduce greenhouse gas (GHG) emissions such that statewide GHG emissions are lowered to 1990 levels by 2020 and 80% below 1990 levels by 2050; and

5. Local government, by itself, cannot fully address all of the challenges posed by climate change and comply with the mandates of AB 32; and

6. Energy efficiency is a key component in reducing GHG emissions, and construction of more energy efficient buildings can help Palo Alto reduce its share of the GHG emissions that contribute to climate change; and

7. On June 2, 2008, the City Council adopted regulations for the incorporation of green building techniques and materials in private residential and nonresidential development projects (Green Building Regulations), Ordinance No. 5006; and a resolution revising those standards was introduced to Council on October 19, 2009; and

8. Building Standards Code establishes building standards for all occupancies throughout the State; and

9. Health and Safety Code Section 17958.5 provides that a city may establish more restrictive building standards if they are reasonably necessary due to local climatic, geological or topographical conditions; and

10. Based on the findings contained in this Ordinance, the City Council has found that certain modifications and additions to the California Building Standards Code are reasonably necessary based upon local climatic, topographical and geological conditions; and

11. In accordance with the 2008 California Building Energy Efficiency Standards, including California Code of Regulations, Title 24, Parts 1 and 6 (Standards) all residential and nonresidential development must meet or exceed the energy efficiency requirements contained therein; and

12. California Public Resource Code Section 25402.1(h)(2) authorizes a city to adopt and enforce increased energy efficiency standards, provided that a determination is made that the local standards are cost effective and they are approved by the California Energy Commission; and

13. On October 19, 2009, an Ordinance Repealing Chapter 16.17 of the Palo Alto Municipal Code and Amending Title 16 to Adopt a New Chapter 16.17, California Energy Code, 2008 Edition was introduced to the City Council; and

14. It is the purpose and intent of this Ordinance to amend the 2008 California Building Energy Efficiency Standards as described herein; and

15. City staff has prepared a new Chapter 16.18 to Title 16 of the Palo Alto Municipal Code, Local Energy Efficiency Standards; and

16. On March 23, 2009, the City hired Gabel Associates, LLC, an expert in the field of building energy analysis and Energy Code compliance, to assist the City in preparing a study and proposal for local amendments to the 2008 California Energy Code, and said study demonstrated the cost effectiveness of these local amendments; and

17. The City will include the Gabel Associates study in an application for consideration by the California Energy Commission in compliance with Public Resources Code 25402.1(h)(2); and

18. The modifications to the 2008 California Building Energy Efficiency Standards required by this Ordinance are reasonably necessary due to local climatic, geologic and topographic conditions, specifically:

a. The City of Palo Alto Utilities (CPAU) is the only municipal utility in California that operates City-owned-utility services including electric, fiber optic, natural gas, water and wastewater services, and as such, the City Council is uniquely concerned that CPAU be able to provide reliable power to Palo Alto residents and businesses, especially in periods of peak energy demand.

b. Summer ambient temperatures in the City during the months of June, July and August can reach over 100 degrees, creating peak energy load demands that can cause power outages, affecting public safety and causing adverse local economic impacts.

c. The total square footage of conditioned habitable space within residential and nonresidential buildings in the City is increasing and using more energy and resources than in the past.

d. The burning of fossil fuels used in the generation of electric power and heating of buildings contributes to climate change, which could result in rises in sea level, including in San Francisco Bay, that could put at risk Palo Alto homes and businesses, public facilities, and Highway 101.

e. Reduction of total and peak energy use as a result of incremental energy efficiency measures required by this Ordinance will have local and regional benefits in the cost-effective reduction of energy costs for building owners, additional available system energy capacity, and a reduction in greenhouse gas emissions; and

19. In order to maintain and advance the energy efficiency standards adopted herein, it is in the best interest of the City to revisit this Ordinance prior to its expiration, ensuring that local energy standards meet the goals of reducing energy consumption, thereby saving on energy bills and decreasing greenhouse gas emissions; and

20. The study conducted by Gabel Associates, LLC has concluded that the energy efficiency measures contained in this Ordinance are cost-effective. The City Council hereby adopts the conclusions of the study and authorizes its inclusion in an application for consideration by the California Energy Commission in compliance with California Public Resources Code Section 25402.1(h)(2). Upon approval by the California Energy Commission, this Ordinance shall be presented to the City Council for final adoption.

SECTION 2. Chapter 16.18 of Title 16, "Building Code," is hereby amended by repealing in its entirety Chapter 16.18 and enacting a new Chapter 16.18 to read and provide as follows:

Chapter 16.18

LOCAL ENERGY EFFICIENCY STANDARDS FOR CERTAIN BUILDINGS AND IMPROVEMENTS COVERED BY THE CALIFORNIA ENERGY CODE, 2008 EDITION

Sections:

16.18.010 Purpose.

The purpose of this Ordinance is to promote the health, safety and welfare of Palo Alto residents, workers, visitors and the environment by minimizing the use and waste of energy in the construction and operation of the City's building stock. The Ordinance sets forth minimum energy efficiency standards within the City of Palo Alto for certain types of residential and nonresidential new construction and renovation, and should be used in conjunction with both the City's Green Building Regulations, located in Chapter 18.44 of Title 18 (Zoning) of the Palo Alto Municipal Code, and the City's Green Building Standards for Compliance, adopted by City Council Resolution. This Chapter is intended to amend the 2008 California Building Energy Efficiency Standards, as specified in the California Code of Regulations, Title 24, Parts 1 and 6 (Standards), adopted by the City at Title 16, Chapters 16.04 and 16.17 of the Palo Alto Municipal Code. Compliance with the 2008 California Building Energy Efficiency Standards is required even if the increased minimum efficiency standards in this Chapter do not apply.

16.18.020 Definitions.

(a) For purposes of this Chapter 16.18, words or phrases used in this Chapter that are specifically defined in Parts 1, 2 or 6 of Title 24 of the California Code of Regulations shall have the same meaning as given in the Code of Regulations. In addition, for the purposes of this Chapter 16.18, the following words and phrases shall have the meanings indicated herein:

(b) "2008 California Building Energy Efficiency Standards", or "California Energy Code", shall mean the Standards and regulations adopted by the California Energy Commission

contained in Parts 1 and 6 of Title 24 of the California Code of Regulations as such standards and regulations may be amended from time to time.

(c) "Energy STAR Portfolio Manager" (Portfolio Manager) shall mean the program managed by the U.S. Environmental Protection Agency that offers an energy management tool that allows an applicant to track and assess energy and water consumption of a building project. Tracked projects receive an energy performance rating on a scale of 1–100 relative to similar buildings nationwide.

(d) "GreenPoint Rated" shall mean a residential green building rating system developed by the Build It Green organization.

(e) "HERS Rating" shall mean the California Home Energy Rating System, a statewide program for residential dwellings administered by the California Energy Commission and defined in the 2008 California Building Energy Efficiency Standards. HERS Phase I provides field verification and diagnostic testing to show compliance with Title 24, Part 6, of the 2008 California Building Energy Efficiency Standards. HERS Phase II includes whole-house home energy efficiency ratings for existing and newly constructed homes.

(f) "LEED®" shall mean the "Leadership in Energy and Environmental Design" green building rating system developed by the U.S. Green Building Council.

(g) "Multi-Family Residential" shall mean a building containing three or more attached dwelling units.

(h) "Nonresidential" shall mean a new or replacement retail, office, industrial, warehouse, service, or similar building(s).

(i) "Nonresidential Compliance Manual" shall mean the manual developed by the California Energy Commission, under Section 25402.1(e) of the Public Resources Code, to aid designers, builders, and contractors in meeting the requirements of the state's 2008 Building Energy Efficiency Standards for nonresidential, high-rise residential, and hotel/motel buildings.

(j) "Proposed Design" is defined in the Residential and Nonresidential Compliance Manuals developed by the California Energy Commission, under Section 25402.1(e) of the Public Resources Code, to aid designers, builders, and contractors in meeting the requirements of the state's 2008 California Building Energy Efficiency Standards for nonresidential, high-rise residential, and hotel/motel buildings.

(k) "Rebuild" shall mean home improvements or minor additions to an existing structure that do not maintain 75% of the existing roof or exterior walls.

(l) "Residential Compliance Manual" shall mean the manual developed by the California Energy Commission, under Section 25402.1(e) of the Public Resources Code, to aid

designers, builders, and contractors in meeting the requirements of the state's 2008 California Building Energy Efficiency Standards for low-rise residential buildings.

(m) "Single-Family or Two-Family Residential" shall mean a single detached dwelling unit or two units in a single building.

(n) "Solar Photovoltaic Energy System" shall mean a photovoltaic solar collector or other photovoltaic solar energy device that has a primary purpose of providing for the collection and distribution of solar energy for the generation of alternative current rated peak electricity.

(o) "Standard Design" is defined in the Residential and Nonresidential Compliance Manuals developed by the California Energy Commission, under Section 25402.1(e) of the Public Resources Code, to aid designers, builders, and contractors in meeting the requirements of the state's 2008 California Building Energy Efficiency Standards for nonresidential, high-rise residential, and hotel/motel buildings.

(p) "Time Dependent Valuation of Energy (TDV Energy)" shall mean the time varying energy caused to be used by a building to provide space conditioning and water heating and, for specified buildings, lighting. TDV Energy accounts for the energy used at the building site and consumed in producing and in delivering energy to a site, including but not limited to, power generation, transmission and distribution losses. TDV Energy is expressed in terms of thousands of British thermal units per square foot per year (kBtu/sq.ft.- yr.).

16.18.030 Buildings Covered.

(a) Nonresidential Construction.

The provisions of this Ordinance shall apply to all nonresidential construction (including Mixed Use and other development) for which a building permit has been applied and accepted as complete by the Building Division on or after the effective date of this Ordinance for:

(1) New construction greater than or equal to 5,000 square feet, including additions to existing buildings.

(2) New construction between 500 square feet and 5,000 square feet, including additions to existing buildings.

(3) Tenant improvements, renovations or alterations greater than or equal to 5,000 square feet that include replacement or alteration of at least two of the following: HVAC system, building envelope, hot water system, or lighting system.

(4) Tenant improvements, renovations or alternations greater than or equal 500 square feet with greater than $100,000 in building permit valuation in a single unit, that are not otherwise covered under Section 3 of Table A of the "City of Palo Alto Green Building Standards for Compliance for Private Nonresidential Construction".

(b) Residential Construction.

The provisions of this Ordinance shall apply to all residential construction for which a building permit has been applied and accepted as complete by the Building Division on or after the effective date of this Ordinance for:

(1) Multi-family new construction of three or more attached units.

(2) Multi-family renovations or alterations greater than or equal to 50% of the existing unit square footage that include replacement or alternation of at least two of the following: HVAC system, building envelope, hot water system, or lighting system.

(3) Multi-family renovations, alterations, additions, and/or rebuilds to individual units greater than or equal to 250 square feet with greater than or equal to $100,000 in building permit valuation in a single unit.

(4) Single-family or two-family new construction greater than or equal to 1,250 square feet.

(5) Single-family or two-family existing home additions or rebuilds greater than or equal to 1,250 square feet.

(6) Single-family or two-family existing home renovations, rebuilds and/or additions between 250 square feet and 1,250 square feet, with greater than $100,000 in building permit valuation in a single unit.

Subject to the foregoing limitation, applicability of the residential or nonresidential sections of this Chapter shall be determined in accordance with either the Residential Compliance Manual or the Nonresidential Compliance Manual, as appropriate for the proposed occupancy.

16.18.040 Compliance Required to Receive Building Permit and Final Inspection.

The Chief Building Official shall be charged with enforcing the provisions of this Ordinance. A building permit application subject to the provisions of this Chapter shall not be issued a building permit by the Chief Building Official unless the energy compliance documentation submitted with the permit application meets the requirements of this Chapter. A final inspection for a building permit subject to the requirements of this Chapter will not be approved unless the work authorized by the building permit has been constructed in accordance with the approved plans, conditions of approvals, and requirements of this Chapter.

16.18.050 General Compliance Requirements.

In addition to the requirements of the 2008 California Building Energy Efficiency Standards the following general compliance requirements shall apply to all building permit applications subject to this chapter:

(a) Nonresidential Construction.

(1) New construction greater than or equal to 5,000 square feet, including additions to existing buildings. The performance approach specified in Section 151 of the 2008 California Building Energy Efficiency Standards shall be used to demonstrate that the TDV Energy of the Proposed Design is at least 15.0% less than the TDV Energy of the Standard Design. Compliance with this Section shall constitute achievement of LEED's minimum energy prerequisite as described in Table A of the "City of Palo Alto Green Building Standards for Compliance for Private Nonresidential Construction and Renovation."

(2) New construction between 500 square feet and 5,000 square feet, including additions to existing buildings. The performance approach specified in Section 151 of the 2008 California Building Energy Efficiency Standards shall be used to demonstrate that the TDV Energy of the proposed building is at least 15.0% less than the TDV Energy of the Standard Design. Compliance with this Section shall constitute achievement of LEED's minimum energy LEED prerequisite as described in Table A of the "City of Palo Alto Green Building Standards for Compliance for Private Nonresidential Construction and Renovation."

(3) Tenant improvements, renovation or alterations greater than or equal to 5,000 square feet that include replacement or alteration of at least two of the following: HVAC system, building envelope, hot water system, or lighting system. Energy efficiency beyond 2008 California Building Energy Efficiency Standard minimums is not required for projects covered by this section.

(4) Tenant improvements, renovations or alternations greater than or equal to 500 square feet with greater than $100,000 in building permit valuation in a single unit, that are not otherwise covered under Section 3 of Table A of the "City of Palo Alto Green Building Standards for Compliance for Private Nonresidential Construction." The applicant shall attain an Energy STAR Portfolio Manager Building Energy Performance Rating prior to the issuance of a building permit, although achievement of a particular rating is not required. Compliance with this Section shall constitute achievement of the Building Energy Performance Rating described in Table A of the "City of Palo Alto Green Building Standards for Compliance for Private Nonresidential Construction and Renovation."

(b) Residential Construction.

(1) Multi-family residential new construction of 3 or more attached units. The building permit applicant must determine whether the building is low-rise or high-rise as defined by the 2008 California Building Energy Efficiency Standards, and then use the appropriate approach as described below:

(i) Low Rise (3 stories or less). The performance approach specified in Section 151 of the 2008 California Building Energy Efficiency Standards shall be used to demonstrate that the TDV Energy of the proposed building is at least 15.0% less than the TDV Energy of the Standard Design. Compliance with this Section shall constitute achievement of GreenPoint Rated's minimum energy prerequisite for new "Multi-Family Residential" construction, as described in Table B of the "City of Palo Alto Green Building Standards for Compliance for Private Residential Construction and Renovation".

(ii) High Rise (4 stories or more). The applicant shall model the building envelope and mechanical system of the Proposed Design consistent with the 2008 Title 24 performance method rules. The applicant shall demonstrate that the TDV Energy of the Proposed Design is less than the TDV Energy of the Standard Design by the percentage (%) required for minimum energy performance specified in the 2009 GreenPoint Rated new "Multi-Family Residential" construction guidelines. Compliance with this Section shall constitute achievement of GreenPoint Rated's minimum energy prerequisite required for new "Multi-Family Residential" construction as described in Table B of the "City of Palo Alto Green Building Standards for Compliance for Private Residential Construction and Renovation."

(2) Multi-family renovations or alterations greater than or equal to 50% of the existing unit square footage that include replacement or alteration of at least two of the following: HVAC system, building envelope, hot water system, or lighting system. The building permit applicant shall determine whether the building is low-rise or high-rise as defined by the 2008 California Building Energy Efficiency Standards, and then use the appropriate approach as described below:

(i) Low Rise (3 stories or less). The performance approach specified in Section 151 of the 2008 California Building Energy Efficiency Standards shall be used to demonstrate that the TDV Energy of the Proposed Design is at least 15.0% less than the TDV Energy of the Standard Design. Compliance with this Section shall constitute

achievement of GreenPoint Rated's minimum energy prerequisite for new "Multi-Family Residential" construction, as described in Table B of the "City of Palo Alto Green Building Standards for Compliance for Private Residential Construction and Renovation".

(ii) High Rise (4 stories or more). The applicant shall model the building envelope and mechanical system of the Proposed Design consistent with the 2008 Title 24 performance method rules. The applicant shall demonstrate that the TDV Energy of the Proposed Design is less than the TDV Energy of the Standard Design by the percentage (%) required for minimum energy performance specified in the current GreenPoint Rated new "Multi-Family Residential" construction guidelines. Compliance with this Section shall constitute achievement of GreenPoint Rated's minimum energy prerequisite required for new "Multi-Family Residential" construction as described in Table B of the "City of Palo Alto Green Building Standards for Compliance for Private Residential Construction and Renovation."

(3) Multi-family renovations, alterations, additions, and/or rebuilds to individual units greater than or equal to 250 square feet with a building permit valuation greater than or equal to $100,000 in a single unit. The applicant shall attain a HERS II rating prior to issuance of the building permit, although achievement of a particular rating is not required. Compliance with this Section shall constitute achievement of the HERS Rating requirement as described in Table B of the "City of Palo Alto Green Building Standards for Compliance for Private Residential Construction and Renovation". Compliance with this Section is not required until January 1, 2011.

(4) Single-family or two-family residential new construction greater than or equal to 1,250 square feet. The performance approach specified in Section 151 of the 2008 Building Energy Efficiency Standards shall be used to demonstrate that the TDV Energy of the Proposed Design is at least 15.0% less than the TDV Energy of the Standard Design. Compliance with this Section shall constitute achievement of GreenPoint Rated's minimum energy prerequisite for new "Single-Family and Two-Family Residential" construction, as described in Table B of the "City of Palo Alto Green Building Standards for Compliance for Private Residential Construction and Renovation".

(5) Single-family or two-family residential additions or rebuilds greater than or equal to 1,250 square feet. The performance approach specified in Section 151 of the 2008 Building Energy Efficiency Standards shall be

used to demonstrate that the TDV Energy of the Proposed Design is at least 15.0% less than the TDV Energy of the Standard Design. Compliance with this Section shall constitute achievement of GreenPoint Rated's minimum energy prerequisite for new "Single-Family and Two-Family Residential" construction, as described in Table B of the "City of Palo Alto Green Building Standards for Compliance for Private Residential Construction and Renovation".

(6) Single-family or two-family renovations, rebuilds and/or additions that are between 250 square feet and 1,250 square feet, and that have greater than $100,000 in building permit valuation in a single unit. The applicant shall attain a HERS II rating prior to issuance of the building permit, although achievement of a specific HERS II rating is not required. Compliance with this Section shall constitute achievement of the minimum energy requirement as described in Table B of the "City of Palo Alto Green Building Standards for Compliance for Private Residential Construction and Renovation". This Section has an effective date of January 1, 2011

16.18.060 Solar Photovoltaic Energy Systems for Multi-Family Residential Construction and Nonresidential Construction.

(a) Installation Criteria and Energy Credit. The installation of any solar photovoltaic (PV) energy system must meet all installation criteria of the California Energy Commission's Guidelines for California's Solar Electric Incentive Program Pursuant to Senate Bill 1. An energy credit from solar PV energy systems may be used to demonstrate compliance with the general compliance requirements of this Ordinance when evaluating LEED® energy performance. This credit is available if the solar PV energy system is capable of generating electricity from sunlight, supplying the electricity directly to the building, and the system is connected, through a reversible meter, to the utility grid. The methodology used to calculate the energy equivalent to the photovoltaic credit shall be the CECPV Calculator, using the most recent version available prior to the permit application date, which may be found on the web site of the California Energy Commission, at www.gosolarcalifornia.org; or shall be another Senate Bill 1 compliant method as approved by the California Energy Commission.

(b) Documentation. In order to demonstrate compliance with the requirements of this Section, a permit applicant may be required to submit supplementary forms and documentation in addition to the building drawings, specifications, and standard energy compliance (Title 24, HERS and Energy STAR Portfolio Manager) report forms, as deemed appropriate by the Chief Building Official.

16.18.070 Expiration.

This Chapter 16.18 shall expire upon the date that the State's 2011 Building Energy Efficiency Standards take effect.

SECTION 3. Severability. Should any section, subsection, paragraph, sentence, clause, or phrase of this Ordinance be declared unconstitutional or invalid for any reason, such declaration shall not affect the validity of the remaining portions of this Ordinance.

SECTION 4. Efforts to Enhance Local Compliance. Given that the purpose of this Ordinance is to adopt stricter local energy efficiency standards for the construction of new buildings within the City, the Council further recognizes that the adoption of new standards without additional education and training for City staff responsible for enforcement of the standards could diminish compliance and potentially undermine the efficacy of the Ordinance. Therefore, in order to ensure greater compliance and enforcement of the applicable energy efficiency standards, better equip staff and provide a greater resource to the City's building community, the City will seek additional education and training opportunities for staff in the areas of energy standards, technology and Energy Code implementation and enforcement.

SECTION 5. Environmental Compliance. The proposed Ordinance preserves and enhances the environment, in that it would set forth minimum energy efficiency standards within the City of Palo Alto for all new residential and nonresidential construction. In accordance with California Environmental Quality Act (CEQA) Section 15061(b)(3), "[C]EQA applies only to projects which have the potential for causing a significant effect on the environment. Where it can be seen with certainty that there is no possibility that the activity in question may have a significant effect on the environment, the activity is not subject to CEQA." Staff has determined that the proposed Ordinance is exempt from CEQA review.

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SECTION 6. Effective Date. This Ordinance shall be in full force and effective on January 1, 2010 or 30 days after its adoption, which ever is later, provided that the Ordinance has also been approved by the California Energy Commission by that date, and shall be published or posted as required by law.

INTRODUCED:

PASSED:

AYES:

NOES:

ABSTENTIONS:

ABSENT:

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:

_____
Deputy City Attorney

APPROVED:

_____
Mayor

_____
City Manager

_____
Director of Planning & Community Environment

_____
Director of Utilities